Federal Aviation Administration – Regulations and Policies
Aviation Rulemaking Advisory Committee

Transport Airplane and Engine Issue Area
Cargo Standards Harmonization Working Group

Task 1 – Main Deck Class B Cargo Compartments

Task Assignment

Aviation Rulemaking Advisory Committee; Transport Airplane and Engine Subcommittee; Hydraulic Test Harmonization Working Group

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Notice of establishment of hydraulic test harmonization working group.

SUMMARY: Notice is given of the establishment of the Hydraulic Test Harmonization Working Group of the Transport Airplane and Engine Subcommittee. This notice informs the public of the activities of the Transport Airplane and Engine Subcommittee of the Aviation Rulemaking Advisory Committee.

FOR FURTHER INFORMATION CONTACT: Mr. William J. (Joe) Sullivan, Executive Director, Transport Airplane and Engine Subcommittee, Aircraft Certification Service (AIR-3), 800 Independence Avenue, SW., Washington, DC 20591, Telephone: (202) 267-9554; FAX: (202) 267-5364.

SUPPLEMENTARY INFORMATION: Federal Aviation Administration (FAA) established an Aviation Rulemaking Advisory Committee (56 FR 2190, January 22, 1991) which held its first meeting on May 23, 1991 (56 FR 20492, May 3, 1991). The Transport Airplane and Engine Subcommittee was established at that meeting to provide advice and recommendations to the Director, Aircraft Certification Service, FAA, regarding the airworthiness standards for transport airplanes, engines and propellers in parts 25, 33 and 35 of the Federal Aviation Regulations (14 CFR parts 25, 33 and 35).

The FAA announced at the Joint Aviation Authorities (JAA)—Federal Aviation Administration (FAA) Harmonization Conference in Toronto, Ontario, Canada, (June 2–5, 1992) that it would consolidate within the Aviation Rulemaking Advisory Committee structure an ongoing objective to "harmonize" the Joint Aviation Requirement (JAR) and the Federal Aviation Regulations (FAR). Coincident with that announcement, the FAA assigned to the Transport Airplane and Engine Subcommittee those projects related to JAR/FAR 25, 33 and 35 harmonization which were then in the process of being coordinated between the JAA and the FAA. The harmonization process included the intention to present the results of JAA/FAA coordination to the public in the form of either a Notice of Proposed Rulemaking or an advisory circular—an objective comparable to and compatible with that assigned to the Aviation Rulemaking Advisory Committee. The Transport Airplane and Engine Subcommittee, consequently, established the Hydraulic Test Harmonization Working Group.

Specifically, the Working Group's task is the following:

The Hydraulic Test Harmonization Working Group is charged with making recommendations to the Transport Airplane and Engine Subcommittee concerning the FAA disposition of the following subject recently coordinated between the JAA and the FAA:

Hydraulic Systems and Test Conditions: Make recommendations concerning new or revised requirements for hydraulic systems and the associated test conditions for hydraulic systems installed in transport category airplanes (FAR 25.1435).

Reports:

A. Recommend time line(s) for completion of the task, including rationale, for Subcommittee consideration at the meeting of the subcommittee held following publication of this notice.

B. Give a detailed conceptual presentation on each task to the Subcommittee before proceeding with the work stated under items C, below.

C. Draft a Notice of Proposed Rulemaking the task proposing new or revised requirements, a supporting economic analysis, and other required analysis, with any other collateral documents (such as Advisory Circulars) the Working Group determines to be needed.

D. Give a status report on each task at each meeting of the Subcommittee.

The Hydraulic Test Harmonization Working Group will be comprised of experts from those organizations having an interest in the tasks assigned. A Working Group member need not necessarily be a representative of one of the organizations of the parent Transport Airplane and Engine Subcommittee or of the full Aviation Rulemaking Advisory Committee. An individual who has expertise in the subject matter and wishes to become a member of the Working Group should write the person listed under the caption **FOR FURTHER INFORMATION CONTACT** expressing that desire, describing his or her interest in the task, and the expertise he or she would bring to the Working Group. The request will be reviewed with the Subcommittee and Working Group Chairs and the individual will be advised whether or not the request can be accommodated.

The Secretary of Transportation has determined that the information and use of the Aviation Rulemaking Advisory Committee and its subcommittees are necessary in the public interest in connection with the performance of duties of the FAA by law. Meetings of the full Committee and any subcommittees will be open to the public except as authorized by section 10(d) of the Federal Advisory Committee Act. Meetings of the Hydraulic Test Harmonization Working Group will not be open to the public except to the extent that individuals with an interest and expertise are selected to participate. No public announcement of Working Group meetings will be made.

Issued in Washington, DC, on December 4, 1992.

William J. Sullivan,

Executive Director, Transport Airplane and Engine Subcommittee, Aviation Rulemaking Advisory Committee.

[FR Doc. 92-30116 Filed 12-10-92; 8:45 am]

BILLING CODE 4910-13-M

Recommendation Letter

Gerald R. Mack
Director
Airplane Certification

Boeing Commercial Airplane Group
P.O. Box 3707, #MS 67-UM
Seattle, WA 98124-2207

ARM-1

November 6, 1995
B-T01B-ARAC-95-009

Mr. Anthony J. Broderick (AVR-1)
Associate Administrator for Regulations and Compliance
Department of Transportation
Federal Aviation Administration
800 Independence Avenue, S.W.
Washington DC 20591

BOEING

Dear Mr. Broderick:

On behalf of the Aviation Rulemaking Advisory Committee, I am pleased to submit the enclosed draft NPRM and draft AC action on the following subjects:

NPRM	**Revision of Hydraulic Systems Airworthiness Standards to Harmonize with European Airworthiness Standards for Transport Category Airplanes**
AC 25.1435-1	**Hydraulic System Certification Tests, and Analysis**

The enclosed package is in the form of a Notice of Proposed Rule Making, including preamble, draft rule, economic analysis and legal analysis, and a final draft Advisory Circular AC 25.1435-1 on Hydraulic System Certification Tests, and Analysis. The package was developed by the Hydraulic Test Harmonization Working Group (WG) chaired by Jim Draxler of the Boeing Company. The membership of the group is a good balance of interested parties in the U.S., Europe and Canada. The group is currently focusing on other issues tasked to the WG, but can be available if needed for docket review.

The members of ARAC appreciate the opportunity to participate in the FAA Rulemaking process and fully endorse this recommendation.

Sincerely,

G. R. Mack

Gerald R. Mack
Assistant Chairman
Transport Airplane & Engine Issues Group
Aviation Rulemaking Advisory Committee

Enclosure
cc: M. Borfitz (617) 238-7199
J. Draxler 02-JX
S. Miller 227-1320

Acknowledgement Letter

Mr. Craig R. Bolt
Assistant Chair, Aviation Rulemaking
Advisory Committee
Pratt & Whitney
400 Main Street
East Hartford, CT 06108

Dear Mr. Bolt

This letter acknowledges receipt of your June 29 and July 2 letters transmitting recommendations from the Transport Aircraft Engine (TAE) issues area addressing widespread fatigue damage and class B and F cargo compartments.

I would like to thank the Aviation Rulemaking Advisory Committee, particularly those members associated with the TAE issues area and the Airworthiness Assurance Working Group and the Cargo Standards Harmonization Working Group. We appreciate the work and resources that industry has given to the development of the recommendation packages.

At this time, the Federal Aviation Administration (FAA) considers submittal of these recommendations as completion of the tasks. Therefore, we shall close the tasks and keep the TAE apprised of the agency's efforts through the FAA report at TAE meetings. Further, if the proposed rules and advisory material generate substantive or controversial comments once they are published in the *Federal Register*, the FAA may task the ARAC to recommend disposition of the comments.

Sincerely,

Thomas E. McSweeny
Associate Administrator for Regulation
and Certification

Recommendation

[4910-13]

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 25

[Docket No. FAA-2001-XXXX, Notice No.]

RIN 2120-

TITLE: Revision of Airworthiness Standards for Class B Cargo Compartments and Adoption of New Standards for Class F Cargo Compartments for Transport Category Airplanes

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Notice of proposed rulemaking (NPRM).

SUMMARY: This document proposes to amend the airworthiness standards for transport category airplanes to incorporate revised standards for Class B cargo compartments and establish standards for a new Class F cargo compartment, and to harmonize those requirements with standards proposed for the European Joint Aviation Requirements 25 (JAR-25). This action is prompted by an accident involving a Boeing Model 747 "combi" airplane, and subsequent testing conducted by the FAA Technical Center. These changes are intended to ensure an acceptable level of safety for airplanes equipped with Class B and the new Class F cargo compartments by standardizing certain requirements, concepts, and procedures contained in the airworthiness standards of the Federal Aviation Regulations (FAR) and the JAR.

DATES: Send your comments on or before [insert a date 90 days after the date of publication in the Federal Register.]

ADDRESSES:

Address your comments to the Docket Management System, U.S. Department of Transportation, Room Plaza 401, 400 Seventh Street, SW., Washington, DC 20590-0001. You must identify the docket number FAA-2001-XXXX at the beginning of your comments, and you should submit two copies of your comments. If you wish to receive confirmation that FAA received your comments, include a self-addressed, stamped postcard.

You may also submit comments through the Internet to http://dms.dot.gov. You may review the public docket containing comments to these proposed regulations in person in the Dockets Office between 9:00 a.m. and 5:00 p.m., Monday through Friday, except Federal holidays. The Dockets Office is on the plaza level of the NASSIF Building at the Department of Transportation at the above address. Also, you may review public dockets on the Internet at http://dms.dot.gov.

FOR FURTHER INFORMATION CONTACT: Mahinder K. Wahi, Propulsion/Mechanical Systems Branch, ANM-112, Transport Airplane Directorate, Aircraft Certification Service, FAA, 1601 Lind Ave SW., Renton, WA 98055-4056; telephone (425) 227-2142; facsimile (425) 227-1320.

SUPPLEMENTARY INFORMATION:

Comments Invited

Interested persons are invited to participate in the making of the proposed action by submitting such written data, views, or arguments as they may desire. Comments

relating to the environmental, energy, federalism, or economic impact that might result from adopting the proposals in this document also are invited. Substantive comments should be accompanied by cost estimates. Comments must identify the regulatory docket or notice number and be submitted in duplicate to the DOT Rules Docket address specified above.

All comments received, as well as a report summarizing each substantive public contact with FAA personnel concerning this proposed rulemaking, will be filed in the docket. The docket is available for public inspection before and after the comment closing date.

All comments received on or before the closing date will be considered by the Administrator before taking action on this proposed rulemaking. Comments filed late will be considered as far as possible without incurring expense or delay. The proposals in this document may be changed in light of the comments received.

Commenters wishing the FAA to acknowledge receipt of their comments submitted in response to this document must include a pre-addressed, stamped postcard with those comments on which the following statement is made: "Comments to Docket No. FAA-2001-XXXX." The postcard will be date stamped and mailed to the commenter.

Availability of Rulemaking Documents

You can get an electronic copy using the Internet by taking the following steps:

(1) Go to the search function of the Department of Transportation's electronic Docket Management System (DMS) web page (http://dms.dot.gov/search).

(2) On the search page type in the last four digits of the Docket number shown at the beginning of this notice. Click on "search."

(3) On the next page, which contains the Docket summary information for the Docket you selected, click on the document number of the item you wish to view.

You can also get an electronic copy using the Internet through FAA's web page at http://www.faa.gov/avr/arm/nprm/nprm.htm or the Federal Register's web page at http://www.access.gpo.gov/su_docs/aces/aces140.html.

You can also get a copy by submitting a request to the Federal Aviation Administration, Office of Rulemaking, ARM-1, 800 Independence Avenue SW., Washington, DC 20591, or by calling (202) 267-9680. Make sure to identify the docket number and notice number of this rulemaking.

Background

On November 27, 1987, a Boeing Model 747-244B combi airplane operated by South African Airways crashed in the Indian Ocean after a fire in the main deck Class B cargo compartment could not be controlled. There were 159 people on board the airplane, and all perished. While the cause of the fire was never established, the South African Board of Inquiry stated that there was clear indication that a fire broke out in the right hand front pallet (one of six) in the main deck cargo hold. According to the South African Board of Inquiry report, the fire could not be controlled and eventually led to the crash. In response to the accident, the FAA issued an airworthiness directive (AD) which required a number of changes in the standards for Class B compartments located on the main deck of certain large airplanes, including Boeing Model 707, 727, 737, 747, and 757 series airplanes, and McDonnell Douglas DC-8, DC-9, and DC-10 series airplanes.

This AD has been superseded twice, the first time because operators and manufacturers reported design and logistics problems in complying with the first AD, and the second time in response to comments received following issuance of the second AD and because new test data were provided by the FAA Technical Center. The current AD, 93-07-15, issued April 14, 1993 (58 FR 21243, April 20, 1993), requires operational and procedural changes, added equipment, and enhanced fire detection and suppression on large main-deck combi airplanes affected by the AD.

A Notice of Proposed Rulemaking (NPRM) (AD) (55 FR 36284, September 5, 1990) was later issued that proposed similar standards for smaller airplanes such as the Aerospatiale Model ATR-42, Dassault Falcon Fan Jet, de Havilland Models DHC-7 and DHC-8, CASA Model C-212, Embraer Model EMB-120, and other series airplanes. This notice was subsequently withdrawn (59 FR 29212, July 20, 1994) because a working group was addressing changes to the part 25 Class B standards under the Aviation Rulemaking Advisory Committee (ARAC), and it was considered desirable to await the development of new certification standards before mandating new airworthiness requirements under 14 CFR part 39.

The Aviation Rulemaking Advisory Committee (ARAC) established the Cargo Standards Harmonization Working Group (HWG), assigning it the task of developing a draft NPRM with supporting material or collateral documents, such as advisory circulars, concerning new or revised requirements for Class B cargo compartments of transport category airplanes (§§ 25.855 and 25.857). If accepted by the ARAC, the draft NPRM would be delivered to the FAA as an advisory committee recommendation. In addition, the working group's scope included developing a similar proposal to amend JAR-25, as

necessary, to achieve FAA/JAA harmonization. The public notice establishing the Cargo Standards Harmonization Working Group appeared in the Federal Register on December 12, 1992 (57 FR 58846). The rulemaking proposal contained in this notice is based on a recommendation developed by the Cargo Standards Harmonization Working Group.

The Aviation Rulemaking Advisory Committee

The ARAC was formally established by the FAA on January 22, 1991 (56 FR 2190), to provide advice and recommendations concerning the full range of the FAA's safety-related rulemaking activity. This advice was sought to develop better rules in less overall time using fewer FAA resources than were previously needed. The committee provides the opportunity for the FAA to obtain firsthand information and insight from interested parties regarding proposed new rules or revisions to existing rules.

There are *64* member organizations on the committee, representing a wide range of interests within the aviation community. Meetings of the committee are open to the public, except as authorized by section 10(d) of the Federal Advisory Committee Act.

The ARAC establishes working groups to develop proposals to recommend to the FAA for resolving specific issues. Tasks assigned to working groups are published in the Federal Register. Although working group meetings are not generally open to the public, all interested parties are invited to participate as working group members. Working groups report directly to the ARAC, and the ARAC must concur with a working group proposal before that proposal can be presented to the FAA as an advisory committee recommendation.

The activities of the ARAC will not, however, circumvent the public rulemaking procedures. After an ARAC recommendation is received and found acceptable by the

FAA, the agency proceeds with the normal public rulemaking procedures. Any ARAC participation in a rulemaking package will be fully disclosed in the public docket.

Discussion of the Proposals

The FAA proposes amending 14 CFR §§ 25.855 and 25.857, as recommended by the ARAC, to (i) establish revised standards for Class B cargo compartments by revising § 25.857(b)(1), (ii) establish standards for newly classified Class F cargo compartment by adding §§ 25.857(f)(1), (2), and (3), and (iii) harmonize these sections with JAR-25. In addition, the introduction of Class F cargo compartment necessitates revising §§ 25.855 (b) and (c) to add requirements for a liner meeting flame penetration standards. The JAA intend to publish a Notice of Proposed Amendment (NPA), also developed by the Cargo Standards Harmonization Working Group, to revise JAR-25 as necessary to ensure harmonization in those areas for which the proposed amendments differ from the current JAR-25. When it is published, the NPA will be placed in the docket for this rulemaking. A new proposed Advisory Circular (AC) 25.857-1X, Class B and F Cargo Compartments, has been developed by the HWG to ensure consistent application of these proposed revised standards. Public comments concerning AC 25.857-1X are invited by separate notice published elsewhere in this issue of the Federal Register. The JAA intends to publish an Advisory Material Joint (AMJ) to accompany its NPA. The proposed AC and the proposed AMJ contain harmonized advisory information.

Existing Cargo Compartment Standards

The existing requirements in part 25 for cargo compartments are in general carried over from the Civil Air Regulations Part 4b, which was recodified as part 25 on February 1, 1965.

During the early post-World War II period, it was noted that adequate fire protection for cargo or baggage compartments included the factors of timely detection of the fire by a crewmember while at his station and prompt control of the fire when detected. Because the requirements for detection and extinguishment varied depending on the type and location of the compartment, a classification system was established. Three classes were initially established and defined as follows:

Class A - A compartment in which the presence of a fire would be easily discovered by a crewmemeber while at his station, all parts of which are easily accessible in flight. This was typically a small compartment used for crew luggage and located in the cockpit where a fire would be readily detected and extinguished by a crewmember. Due to the small size and location of the compartment, and the relatively brief time required to extinguish a fire, a liner was not needed to protect adjacent structure.

Class B - A compartment with sufficient access in flight to enable a crewmember to effectively reach any part of the compartment with the contents of a hand fire extinguisher and that incorporated a separate, approved smoke or fire detection system to give warning at the pilot or flight engineer station. A Class B compartment was typically much larger than a Class A compartment and could be located in an area remote from the cockpit. Because of the larger size of the compartment and the greater time interval likely to occur before a fire would be controlled, a liner meeting the flame penetration standards of § 25.855 and Appendix F of part 25 was needed to protect adjacent structure.

Class C - As defined at the time of initial classification, any compartment that did not fall into either Class A or B was a Class C compartment. Class C compartments differ from Class B compartments primarily in that built-in extinguishment systems are

provided for control of fires in lieu of crewmember accessibility. The volumes of Class C compartments in currently-used domestic jet transport airplanes range from 300 to over 3,000 cubic feet.

Class E - A compartment of an airplane used only for the carriage of cargo. Class E compartments are distinguished by the requirement that the flighrcrew have a means to shut off the ventilating airflow to or within the compartment. Moreover, because an oxygen-deprived fire might continue to smolder for the duration of the flight, the capability of the liner (see 14 CFR 25.855) to resist flame penetration is especially important.

Due to accessibility considerations, a compartment located below the main cabin must generally be a Class C compartment. Cabin flooring utilized to protect adjacent structure from fire originating in a cargo or baggage compartment located above the floor cannot also serve as the lining for a compartment located below the floor.

Current Class B Requirements:

The requirements for Class B cargo compartments today state:

§ 25.857(b) Class B. A Class B cargo or baggage compartment is one in which-

(1) There is sufficient access in flight to enable a crewmember to effectively reach any part of the compartment with the contents of a hand fire extinguisher;

(2) When the access provisions are being used, no hazardous quantity of smoke, flames, or extinguishing agent, will enter any compartment occupied by the crew or passengers;

(3) There is a separate approved smoke detector or fire detector system to give warning at the pilot or flight engineer station.

In addition, § 25.855 states that Class B compartments must have a liner, and that the liner materials must meet the test requirements of Part I to Appendix F of part 25, which dictates flammability requirements for materials. Section 25.858, which was added at Amendment 25-54, September 11, 1980, requires that the detection system must provide a visual indication to the flightcrew within one minute after the start of a fire. In addition, the system must be capable of detecting the fire at a temperature significantly below that at which the structural integrity of the airplane is substantially decreased.

These standards were developed when cargo compartments were relatively small, and airplanes were powered by reciprocating engines. With the advent of larger turbine-powered airplanes, cargo compartments increased in size, operating altitudes increased, and many routes involved very long flight times. In addition, combination passenger/cargo configurations were introduced. These airplanes, sometimes referred to as "combi's," were designed to carry both passengers and cargo on the main deck. The passenger and cargo compartments were separated by a barrier intended to prevent smoke and gasses from entering occupied areas, and to physically divide the two areas. In some combi's, the barrier is movable to change the available cargo and passenger capacity as needed for specific operational requirements. The South African 747 airplane involved in the accident was a combi configuration with approximately half the airplane main deck holding cargo pallets and the remainder of the main deck accommodating passengers.

Liners for Class B compartments are required to meet the flammability requirements of Part I to Appendix F of part 25, which offers significantly less resistance to flame penetration than the liners required in Class C compartments. The logic behind this level of protection is that the fire will be detected quickly and a crewmember will

enter the compartment and extinguish the fire before it reaches a level of severity which could damage the liner or airplane structure. In Class C compartments the fire is controlled rather than extinguished, so improved protection is required. These fires may continue to burn or smolder for some time, yielding higher temperatures at the liner. In addition, inflight access for Class C is not required. It is therefore difficult to ascertain that the fire is controlled or extinguished.

Need for New Standards

The South African Airways accident led the FAA and JAA to consider Class B cargo compartments on certain airplanes, above a certain size, an unsafe configuration. Entering the compartment to combat a fire was believed to be ineffective for cargo compartments larger than 200 cubic feet in volume. It was desirable to conduct tests with actual fires to try to more closely establish the maximum Class B compartment size. The FAA Technical Center Fire Safety Branch conducted a number of ground tests using an airplane hull with a cargo compartment located in the rear of the passenger cabin. This simulated compartment had smoke detection, ventilation rates and air balance approximately the same as would be encountered in a flight, and an entry door representative of those in the smaller transport airplane compartments.

Testing at the FAA Technical Center led to several conclusions. During actual fire testing using varying fire loads, conducted in the simulated Class B compartment with a volume of 175 cubic feet, it was discovered that flight attendants equipped with protective breathing equipment and a hand held fire extinguisher, but without protective clothing, were unwilling to enter the cargo compartment when a fire was present. During other tests, it was discovered that trained fire fighters, dressed in full fire fighting gear,

found it unnecessary to enter the compartment to extinguish the fire. The firemen opened the door to the compartment and took action to extinguish the fire from the doorway. This led the working group to conclude that reliance on physically entering the cargo compartment to extinguish the fire was unrealistic. A standard based on such an expectation was undesirable.

There are, however, requirements by other Federal regulations for carriage of certain hazardous materials that mandate access to the compartment. For this reason, the capability to enter a cargo compartment to monitor the contents must be retained. It is noted that there is no regulatory prohibition against access to any class of cargo compartment in flight provided all applicable regulations are met.

In reviewing the existing Class B compartments in the transport fleet, the working group noted that there are several configurations in use which would not satisfy the concern with fighting the fire without entering, but which remain important operations. Operators serving small isolated towns and villages in Alaska and Northern Canada have identified a unique need for combi operations to sustain these areas, which have no means of supply other than air cargo. The HWG believes that the requirements for a new Class F compartment, proposed in this notice, would allow for the flexibility in new airplane designs required to accommodate these needs, while ensuring that adequate fire control can be obtained.

Regional airlines tend to have relatively short route structures, thus making an immediate landing to combat a fire a viable alternative and reducing the time during which the fire must be combated in the air. Business airplanes and those operated by regional airlines usually have smaller Class B compartments, often similar in size to the

carry-on luggage racks and coat closets found on large transports. The contents of the compartments are usually baggage rather than cargo. For these reasons, the operators of these airplanes do not believe they have the same element of risk that could be present on larger airplanes where Class B compartments may contain both baggage and cargo.

When considering the role of access to small compartments for fighting a fire, it was recognized by the working group that there is some size of compartment in which a fire can be effectively combated by direct access. When the HWG considered the testing conducted by the FAA Technical Center, it was deemed more appropriate to stipulate an access requirement which will place a practical limit on compartment size rather than specifying a maximum allowable volume. It was decided that by stipulating that the person fighting the fire must be able to reach any part of the compartment by hand or with the contents of a hand extinguisher, when standing at any one access point, i.e., the access door to the compartment, the size of the compartment would be a function of how the compartment is configured. It is not considered appropriate to have to pull baggage or cargo out on to the floor of the passenger compartment to gain access to the seat of the fire, particularly for certification compliance demonstration or substantiation. It is believed that such action may introduce a safety hazard to the passengers, e.g., products of combustion. Section 25.857(b)(1) relative to Class B cargo compartments is therefore being revised to read: There is sufficient access in flight to enable a crewmember, standing at any one access point and without stepping into the compartment, to extinguish a fire occurring in any part of the compartment using a hand fire extinguisher. The liner requirements for a Class B compartment, § 25.855(b), remain unchanged.

New Class F Cargo Compartment Standards

This notice proposes to add standards for a new Class F cargo compartment to accommodate the carriage of baggage and cargo, which does not contain the requirements for a built-in fire extinguishing system and means to control ventilation and drafts within the compartment as is stipulated for Class C compartments. It is noted that existing fire extinguishing systems in Class C compartments do not in reality extinguish the fire. These systems, which currently depend on Halon 1301 for the agent, control the fire by interrupting the combustion process. A deep-seated smoldering fire can flare up when the Halon concentration drops below a specific level.

The proposed Class F compartment utilizes either (i) a crewmember to access the compartment with a hand fire extinguisher, or, (ii) other means of controlling the fire without requiring a built-in extinguishing system. These requirements are added as the proposed § 25.857(f)(1). The proposed §§ 25.857(f)(2) and (f)(3) are identical to the existing §§ 25.857(c)(3) and (c)(1) respectively and are added as the requirements to exclude hazardous quantities of smoke, flames, or extinguishing agent, from any compartment occupied by the crew or passengers and to provide a separate approved smoke detector or fire detector system to give warning at the pilot or flight engineer station. A liner, meeting the same standards as currently required for a Class C, must be provided unless there are other means provided for containing the fire and protecting critical systems and structure. This requirement is added for the Class F Cargo Compartments by revising §§25.855(b) and (c).

One possible design solution that was considered by the working group is the use of Class C containers carried inside the new Class F compartment. This would provide a

means of compliance similar to that offered in one of the options in the combi AD. The requirement for the containers would have to be part of the type design of the airplane. This is included in the proposed AC as an acceptable means of compliance.

Another method of controlling fires in the new Class F compartments, used in responding to the combi AD, utilized a system to distribute the contents of a hand held fire extinguisher throughout the compartment. This was accomplished through installation of an external nozzle in the compartment wall or liner, interfacing with the hand fire extinguisher. Internal plumbing then carried the extinguishing agent throughout the compartment. This provision allows airplanes to be certificated with compartments that are less expensive in terms of hardware, do not require a flight crewmember to enter the compartment, and utilize route structure to ensure that the airplane can land before the available fire extinguishing capability is exhausted. This allows the fire to be combated on the ground. This is included in the proposed AC as an acceptable means of compliance.

Dissenting Opinions

Working Group members representing the Regional Airlines and airframe manufacturers have submitted a letter to the HWG chairman strongly objecting to the direction the Cargo Standards Harmonization Working Group is taking. The letter states that the South African combi accident represents a situation that does not exist within the regional airline market. Three reasons are stated in support of this position. (1) The regional airlines are in existence only to move passengers; therefore, well over 90% of their cargo carrying capacity is taken up with passenger baggage. (2) The regulatory authorities have not established that an unsafe condition exists for this class of airplane;

there have been no accidents or incidents involving Class B compartments on regional airplanes to support such a position. (3) Regional airlines are generally not more than 20 minutes away from a suitable airport if an emergency landing is required to combat a fire.

In addition, the regional operators and manufacturers are concerned that, after a new set of requirements is established, the FAA and other regulatory authorities will make the new requirements mandatory for the existing fleets. This process by airworthiness directive action or change in the operating rules could have far reaching affects on the regional operators. These concerns are expressed in a letter, dated March 31, 1995, and signed by representatives of two operators, the Regional Airline Association, and two manufacturers. The letter has been included in the docket for this rulemaking action.

The regulatory authorities, the International Federation of Air Line Pilots Association, and the United States Air Lines Pilots Association, International, are not in agreement with the basic premises of this letter. First, there are a number of reports of fires originating in passenger baggage. Representatives of the FAA Airport Security organization attended one of the HWG meetings and noted that they have many reports of "smoking luggage." Usually, this is detected before the baggage is loaded on the airplane. The authorities acknowledge that the short distances to a suitable airport while in flight are certainly a factor. This rulemaking package recognizes that fact, and allows for methods of controlling a fire in the new Class F compartments that are time limited. Whether or not there have been fires in the airplanes operated by regional airlines is not a sound criterion for determining whether such an incident will occur.

This proposal is for a change in the standards in 14 CFR part 25. Whether the same or similar standards are applied retroactively either through AD action or through a change in the operating rules is the subject of different rulemaking proposals which must be justified separately. The application of new proposals to "derivative" airplanes is also the subject of separate rulemaking action. The HWG concluded that it would be inappropriate for them to predicate action based on what the future will bring in terms of application of these proposed requirements to existing or derivative airplanes. The FAA agrees with this conclusion.

To complement the proposed changes to part 25 discussed above, additional material is proposed in advisory circular form (proposed AC 25-XX, Class B and F Cargo Compartments), as an acceptable, but not the only, means of compliance. As noted above, public comments concerning this proposed advisory circular are invited by separate notice.

Paperwork Reduction Act

In accordance with the Paperwork Reduction Act of 1995 (44 U.S.C. 3507(d)), the FAA has determined that there are no requirements for information collection associated with this proposed rule.

International Compatibility

In keeping with U.S. obligations under the Convention on International Civil Aviation, it is FAA policy to comply with International Civil Aviation Organization (ICAO) Standards and Recommended Practices to the maximum extent practicable. The FAA determined that there are no ICAO Standards and Recommended Practices that correspond to these proposed regulations.

Economic Evaluation, Regulatory Flexibility Determination, International Trade Impact Assessment, and Unfunded Mandates Assessment

Proposed changes to Federal regulations must undergo several economic analyses. First, Executive Order 12866 directs that each Federal agency shall propose or adopt a regulation only upon a reasoned determination that the benefits of the intended regulation justify its costs. Second, the Regulatory Flexibility Act of 1980 (the Act) requires agencies to analyze the economic impact of regulatory changes on small entities. Third, the Trade Agreements Act (19 U.S.C. section 2531-2533) prohibits agencies from setting standards that create unnecessary obstacles to the foreign commerce of the United States. In developing U.S. standards, this Trade Act requires agencies to consider international standards and, where appropriate, that they be the basis of U.S. standards. And fourth, the Unfunded Mandates Reform Act of 1995 requires agencies to prepare a written assessment of the costs, benefits and other effects of proposed or final rules that include a Federal mandate likely to result in the expenditure by State, local or tribal government, in the aggregate, or by the private sector, of $100 million or more in any one year (adjusted for inflation).

In conducting these analyses, the FAA has determined that this rule: (1) has benefits which do justify its costs, is not a "significant regulatory action" as defined in the Executive Order, but is "significant" as defined in DOT's Regulatory Policies and Procedures; (2) will not have a significant impact on a substantial number of small entities; (3) reduces barriers to international trade; and (4) does not impose an unfunded mandate on state, local, or tribal governments, or the private sector. These analyses, available in the docket, are summarized below.

Cargo Compartments

Class B - Current Requirements of Class B Cargo Compartment

According to the cargo compartment classification presented in § 25.857(b), a Class B cargo or baggage compartment is a compartment with sufficient access in flight to enable a crewmember to effectively reach any part of the compartment with the contents of a hand fire extinguisher and that incorporated a separate, approved smoke or fire detection system to give warning at the pilot or flight engineer station.

A Class B compartment is typically considerably larger than a Class A compartment, and can be located in an area remote from the cockpit. The materials of a liner for Class B compartments must meet the test requirements of Part I to Appendix F of part 25, which dictates flammability requirements for materials. Section 25.858 (which was added as Amendment 25-54, September 11, 1980) requires that the detection system must provide a visual indication to the flightcrew within one minute after the start of a fire.

Modified Class B Cargo Compartment

The proposed modification to the current Class B compartment standard involves the following condition: There is sufficient access in flight to enable a crewmember, standing at any one access point and without stepping into the compartment, to extinguish a fire occurring in any part of the compartment by using a hand fire extinguisher. The crewmember should be able to open the door, or hatch, and standing at the opening, reach by hand anywhere in the compartment where cargo or baggage can be located. This requirement, by its nature, significantly limits the size of the compartment. The proposed - Class B compartment must have, as the current Class B compartment: a liner (of the same type); a fire/smoke detection system to give warning to the pilot or flight engineer station; and means to ensure that no hazardous quantity of smoke, flames, or

extinguishing agent will enter areas occupied by the crew or passengers. Therefore, the basic **difference** between the current and the proposed Class B compartments is that the allowable size of the proposed Class B compartment will be significantly smaller than the allowable size under the existing rules.

New Class F Cargo Compartment

The proposed Class F compartment is one in which there are means to control or extinguish a fire without requiring a crewmember to enter the compartment to conduct manual firefighting. This compartment, unlike the proposed Class B cargo compartment, would not be limited in size. For the proposed Class F cargo compartment, the following features would also be required: (1) a fire detection system that meets part 25, § 25.858, (2) a means to exclude cargo compartment smoke and fumes from entering occupied spaces, and (3) a liner, if determined necessary. If a liner is necessary to meet § 25.855(b)(2) for the specific Class F cargo compartment design, it would be required to meet part 25, Appendix F, Part III, or an equivalent standard.

The proposed Class F cargo compartment could apply to a wide range of cargo compartment sizes and designs. Potential methods of meeting the proposed Class F requirements could include use of specialized cargo containers, installation of ports to release the contents of portable hand-held fire extinguishers into the cargo compartment, or installation of a built-in fire suppression system (similar to, although not identical to, a Class C cargo compartment). Examples of potential Class F compartments include the following: (1) a small, enclosed luggage stowage area which does not meet the specific firefighting access requirements for the proposed Class B cargo compartment, but provides other compensating features, such as cargo covers or exterior ports and tubing to distribute extinguishing agent

from hand held fire extinguishers to areas that cannot be accessed from the doorway to the compartment, (2) a large main deck cargo compartment, similar in size to those currently found on large transport-category airplanes manufactured by Boeing and McDonnell Douglas which incorporates a novel built-in fire suppression system for which Class C cargo compartment requirements cannot be directly applied, (3) a cargo compartment which incorporates special containers with fire detection and suppression features built into the containers themselves. Besides the examples discussed above, other fire protection systems could be developed to meet the proposed Class F cargo compartment requirements.

Fire Suppression Agents - Halon

In the fire suppression system of the proposed Class F cargo compartment, there is a choice as to the fire-suppression agent to be used. Halon (a halogenated hydrocarbon) has been the agent of choice in such systems and is an effective agent. However, there are other agents which can be used. There may be future difficulties in the use of Halon. Although reserve supplies of Halon are currently available, the manufacture of additional Halon is restricted under the Montreal Protocol, an international agreement (implemented in 1987) which has as an objective to phase out production of ozone-depleting substances, including Halon. The Montreal Protocol prohibits the manufacture or import of new Halon in all developed countries - including the United States - as of January 1, 1994, and will extend this prohibition to developing countries in the future. At this time, there is no restriction on the use of existing supplies of Halon manufactured prior to 1994.

In the past, some operators expressed concern that they would be required to install fire suppression systems which would utilize Halon, and subsequently be required by the FAA, or another government agency, to replace the suppression systems with systems that do not utilize

Halon. However, the FAA would not do so for two reasons. First, Halon has been shown to be an effective suppression agent; thus, due to safety considerations, the FAA would not require its replacement. Second, the FAA would not require its replacement due to environmental considerations because the agency does not have the statutory authority to do so. The Federal agency that would have that authority is the Environmental Protection Agency (EPA). In connection with previous regulatory analysis ("Revised Standards for Cargo or Baggage Compartments in Transport Category Airplanes"), the EPA advised that it does not intend to ban the use of Halon in installed fire suppression systems for the life of the airplanes, and that it can support these policies in international negotiations related to airplane or environmental matters. However, the EPA support is conditional on airline and airplane industry support of on-going efforts to develop suitable alternatives for use in future airplanes, and on FAA's accelerated efforts to develop criteria for certification of alternatives.

One promising alternative is the use of water misting systems. The FAA has conducted a comprehensive program to develop cabin water misting systems. Since the future availability of Halon is uncertain, the FAA specifically invites comments concerning the following: (1) The cost, feasibility and availability of Halon for use as the suppression agent in the new Class F compartment; (2) The cost, feasibility and availability of water misting systems that could provide protection from fires occurring in cargo or baggage compartments as well as in the cabin, and; (3) The cost, feasibility and availability of other possible alternative agents.

Airplanes Affected

The proposed rule would affect only newly-certificated airplanes. Previously-certificated airplanes that incorporate Class B cargo compartments primarily include: (1) business jets, (2)

commuter-type airplanes, and (3) large transports with large main-deck cargo compartments such as the Boeing Model 737-200C and 747-200C "Combi" airplanes. It is anticipated that similar airplanes of these types would be developed in the future, and would be required to comply with the proposed rule. The text below discusses expected costs from the rule on the three types of airplanes listed above.

Costs

The proposed rule would provide manufacturers with a revised Class B and a new Class F compartment. The FAA anticipates that the revised Class B cargo compartment classification would accommodate new airplanes purchased by operators of previously-certified airplanes with small Class B compartments. The new Class F cargo compartment classification would accommodate new airplanes purchased by operators of previously-certified large transport-category airplanes with large Class B cargo compartments such as the Boeing Model 747-200 and 737-200 "Combi's." A third potential option for new airplanes would be the incorporation of a Class C cargo compartment in lieu of the revised Class B or the new Class F compartments. The specific option, Class B, C, or F, selected by a manufacturer in the design of the cargo compartment on a new airplane would depend on the specific needs of their customers.

Business jets: Business jets usually have small Class B compartments, similar in size to the carry-on luggage racks and coat closets found in large transport airplanes. The FAA expects that incorporation of the revised Class B compartment standard for business jets would result in zero incremental cost because the Class B cargo compartments on existing airplanes are sufficiently small so that the proposed rulemaking would require no reduction in compartment size or addition of hardware. The FAA also expects that incorporation of the proposed Class B or Class F cargo compartment standard for **commuter-type airplanes** would result in zero, or nominal,

incremental cost because: (1) the revised Class B cargo compartment could accommodate the cargo needs of most U.S. commuter airlines at no incremental cost on a new-design airplane, and (2) nominal airplane design changes could be developed, at minimal cost increases, in order to maintain overall cargo capacity and meet the new requirements. An analysis was conducted to assess the potential impact on these types of airplanes if no changes in their design occurred as a result of the proposed rule. This analysis (available in the full regulatory evaluation) showed that for a number of existing airplane models, implementation of the proposed rule would result in either no loss or a relatively small loss of cargo compartment space.

"Large Combi" airplanes: "Large Combi's" are large transport category airplanes that have both passenger compartments and Class B cargo compartments on the main deck. The Class B cargo compartments on existing airplanes of this type are very large compared to those found on business jets and commuter airplanes. Several U.S. airlines operate "Combi" airplanes manufactured by Boeing and McDonnell Douglas. Although the airplane involved in the 1987 accident was a Boeing Model 747-200 "Combi," no U.S. airline currently operates Boeing Model 747s in the "Combi" configuration. These airplanes are primarily used by European, Canadian, and Asian airlines. A few U.S. airlines operate Boeing Model 727, 737, and DC-9 Combi's. These airlines generally serve isolated areas in Alaska or the South Pacific. Therefore, this analysis evaluates the incremental cost to incorporate the new Class F cargo compartment for a new-design large transport-category airplane, as it compares to the cost of a similar compartment that meets the existing Class B standard.

Cost of the Proposed Class F Cargo Compartment

The cost analysis is based on the incremental cost of incorporating the proposed Class F requirements versus the existing Class B requirements on a large "Combi" airplanes -

specifically, on a "Combi" similar in size and configuration to the Boeing Model 737-200C. This type of airplane was selected because U.S. airlines currently operate Boeing Model 737-200C airplanes and would most likely continue to operate them in the future.

The proposed Class F cargo compartment requirements allow for a wide range of cargo fire protection strategies. Methods of meeting Class F requirements could include, in part: (1) use of special cargo containers, (2) installation of a water misting system, (3) installation of a built-in suppression system that uses Halon or another suppressant agent, and (4) installation of a suppression system that relies on a distribution system to direct the contents of hand-held fire extinguishers to certain areas of the cargo compartment. After evaluating several options, a fire protection system incorporating a built-in fire suppression system was selected for this analysis. This system would use Halon 1301, and would incorporate other features including a fire detection system and a partial liner that meets part 25, Appendix F, Part III. The FAA believes that this type of system would likely be selected by U.S. operators because it would provide maximum flexibility for cargo loading with minimal logistical impact. The primary difference between the cargo compartment used in this cost analysis, and a Class C compartment, would be that all parts of the liner in the proposed Class F compartment would not necessarily meet part 25, Appendix F, Part III.

The number of these airplanes expected to be operated by U.S. companies is estimated in the range of 15-30. According to available data, there has been a significant decline over time in the number of "Combi's" operated by U.S. airlines. This number decreased steadily from 228 in 1974 to 151 in 1980, to 34 in 1990, and 17 in 1998. Consequently, the cost analysis uses 15 airplanes as the base case, but will also estimate costs for 30 such airplanes in order to provide a

cost estimate range of new airplanes – in being conservative (and to cover a possible reversal in their declining trend). The period of analysis is 25 years.

The cost estimates, expressed in 1999 dollars, are based on a hypothesized Class F cargo compartment that is very similar to a Class C compartment, with the exception that the cargo compartment liner does not fully meet Class C requirements. The cost estimates for the components of the fire-suppression system for 15 and 30 airplanes are presented in Table 1. Some fixed costs pertain to the entire fire-suppression system, e.g., development/certification of the liner, while other fixed costs pertain to a single airplane, e.g., parts and installation of the liner. The former type of fixed costs are allocated over the relevant number of new design airplanes, and thus change per airplane as the number of airplanes changes. The latter type of fixed costs stays constant irrespective of the number of airplanes.

Table 1

ESTIMATING COST OF F COMPARTMENT'S FIRE-EXTINGUISHING SYSTEM

(Based on B-737 Combi Airplane)

Year	Development/certification of fire supression system	Parts/installation of fire suppression system	Development/certification of liner	Parts/installation of liner	Fire detection system	Extra fuel cost	Maintenance	Total Costs	Total Costs - Discounted
	Fixed	Fixed	Fixed	Fixed	Fixed	Variable	Variable		
Total - 1 plane						$211,056	$54,456	$1,180,013	$1,041,387
Fixed costs are based on 15 planes									
Total - 15 planes								$17,700,195	$15,620,805
Total - 30 planes								$33,821,160	$29,662,380

Cost Components of the F Cargo Compartment

1. **Smoke/Fire Detection System.** Incorporation of a "one minute" fire detection system in a new Class F cargo compartment represents zero incremental cost to the manufacturer (or operator) because it is a current requirement.

2. **Development and Certification of the Fire-Suppression System.** The cost for this task is expected to be one of the most significant costs because it would include the designing, testing,

and certification of a "built-in" fire-suppression system that is not required under the existing Class B regulation. This cost is a fixed (one-time) cost. The fire suppression system would use Halon 1301 as the suppression agent. The FAA estimates that the total cost to develop and certify a fire suppression system for a single airplane would be $585,000. This fixed cost is distributed among each of the 15 airplanes used in the analysis, at a cost of $39,000 per airplane.

3. **Parts and Installation of the Fire-Suppression System.** The fire suppression system would consist of three main components: (1) suppression agent stored in a bank of bottles, (2) a distribution system for directing the suppression agent into the cargo compartment, and (3) mechanical and electrical controls for the distribution system. The actual cost for parts and installation of the fire suppression system will vary, depending on how much stored Halon 1301 is included in the system. The quantity of Halon required on a given airplane depends on the cargo compartment size and configuration, and the diversion times associated with the route structure in which the airplane will be flown. A maximum diversion time of 60 minutes was used for this analysis because it is representative of Boeing Model 727 and 737 "Combi" operations in Alaska. The quantity of Halon provided by the fire suppression system must be sufficient to provide an initial "knock down" volumetric concentration of at least 5 percent, followed by a sustained minimum 3 percent volumetric concentration for the duration of the diversion. The FAA estimates that approximately 385 pounds of Halon, stored in seven 55-pound bottles, would be needed to provide 60 minutes of protection. The FAA estimates that the total cost of the Halon and bottles would be $87,500. The total cost of the fire suppression system would include the bottles of stored Halon, and the parts and installation of the distribution system and electrical/mechanical controls. The total estimated cost of the fire-suppression system, including the bottles of stored Halon, is $282,000 per airplane.

4. **Development and Certification of the Liner.** The costs for development and certification of the liner are one-time costs. Upgrade of the liner requirement from part 25, Appendix F, Part I (required under the existing Class B regulation) to Part III (per the proposed Class F requirements) would result in incremental costs for development and certification. The FAA estimates that the cost for development and certification of the liner would be $994,214, or $66,281 per airplane for 15 airplanes.

5. **Parts and Installation of the Liner.** The FAA estimates that the cost per airplane for the parts and installation of the liner would be $527,106. This is the incremental cost of a liner that, for the most part, meets part 25 Appendix F Part III requirements specified for the proposed Class F cargo compartment.

6. **Extra Fuel Cost.** Installation of the fire-suppression system to meet the proposed Class F regulation will result in an increase in the weight of the airplane over the weight of a similar airplane certified under the existing Class B regulation. This increase in weight will result in increased fuel costs. The FAA estimates that installation of the fire-suppression system on the airplane used in the analysis will result in an incremental weight increase of approximately 560 pounds per airplane. This is calculated by assuming that each Halon bottle weighs 13 pounds empty, and can hold 55 pounds of Halon. A price of $1.00 per gallon for jet fuel was used to account for recent price increases of that commodity. For most of 1998 and 1999, the price of jet fuel was under $0.50 per gallon. The resulting annual incremental cost for fuel due to weight increase is $8,794 per airplane per year.

7. **Manual firefighting equipment**. Incorporation of the proposed Class F requirements would not result in additional cost because manual firefighting equipment requirements are unchanged.

8. **Capability to exclude hazardous quantities of smoke, flames, or extinguishing agent from compartment occupied by crew or passengers.** Incorporation of the proposed Class F requirements would not result in additional cost because the capability to exclude smoke and fumes from occupied space is already required under Class B cargo compartment requirements.

9. **Maintenance**. Increased maintenance costs due to incorporation of the proposed Class F requirements would include maintenance and inspections associated with the fire suppression system, which otherwise would have not been required under the existing Class B regulations. Increased maintenance includes: (1) system leak checks; (2) visual inspections; (3) sensor tests; and (4) hydrostatic check of the Halon 1301 storage bottles. The cost estimates for the first three maintenance activities are for the entire group of bottles. The cost estimate for the hydrostatic check is based on the cost for individual bottles. The leak check, visual inspection, and sensor test would be accomplished yearly and would take 8.5 man-hours, 2.0 man-hours, and 1.5 man-hours per airplane respectively. At a burdened hourly rate of $62.50 per hour, the cost of these checks, for the group of seven halon bottles, is estimated to be $929 per year. The hydrostatic check would involve removing and replacing the fire-extinguishing bottles once every five years, and returning them to the Halon provider for charging and leak checks at a cost of approximately $830 per bottle (costs typically vary between $600 and $1,000 per bottle). Bottle removal and replacement would take approximately two man-hours per bottle. Consequently, it is estimated that the cost to remove, replace, and service the group of seven halon bottles on one airplane, would be $6,700 per five years, or $1,340 per year. The combined annual cost for the four maintenance activities is $2,269 ($929 plus $1,340).

Total Costs

The cost for incorporation of Class F cargo compartment requirements on 15 airplanes is estimated at $15.6 million discounted, or $17.7 million undiscounted dollars. In discounting and summing all of the system costs over the 25-year period of analysis, for 15 and 30 Combi airplanes, the result is a range of $15.6 to $29.7 million respectively in discounted costs. Most of these costs are for purchasing and installing the fire-suppression system (including the liner).

Benefits

This proposed rule provides two main benefits; first, increased safety of air transportation and, second, harmonization of standards on cargo compartments between the U.S. and Europe. The rule is expected to create an enhanced level of safety, in transport category airplanes, by preventing accidents and incidents from fires, and by improving the ability (of the airplane and the crew) to control and suppress fires in the event that they start. The proposed rule could prevent a similar occurrence in the future because: (1) the allowable cargo compartment size, for which manual firefighting is the primary means of controlling cargo fires, would be significantly reduced, and (2) improved fire protection features for larger cargo compartments, versus those required under the existing Class B regulation, would be required. Both the proposed Class B and Class F cargo compartments provide more effective fire protection than the existing Class B cargo compartment. The proposed Class B compartment is smaller and more accessible for manual firefighting than the existing Class B cargo compartment. For larger compartments, the proposed Class F compartment would incorporate fire protection features that would eliminate the

need for manual firefighting inside the cargo compartment, which has been shown to be ineffective in larger cargo compartments by testing at the FAA Technical Center.

The prospective benefits of the proposed rule would be the prevention of loss of lives and the avoided cost of a crashed airplane. The fire which occurred on the South African "Combi" is a rare event and rare events cannot be predicted with accuracy. Consequently, range estimates of benefits were made for the 25-year period. Benefits were estimated for the first year and the last, or 25th year, by using the number of lives lost and the equipment loss due to an accident. The value used for an individual life is $2.7 million, while the estimated value of a new design Boeing Model 737 "Combi" airplane was calculated at $23.48 million (average of the Boeing Model 737-300, -400, and -500 passenger airplanes). If an accident was to be prevented in the first year (of the next 25 years), the combined benefit for lives saved and the airplane is estimated to be $422.9 million. If the accident was prevented in year 20, the present value of the benefits is estimated to be $116.9 million, while if the accident was to occur in year 25, the present value of the benefits is estimated to be $83.3 million.

Benefit/Cost Comparison

The estimated benefits of the proposed rule are greater than the estimated costs by a considerable margin. The discounted benefits are estimated to be in the range of $83.3 to $422.9 million, while the discounted costs are estimated in the range of $15.6 to $29.7 million. Moreover, the quantified benefits do not include the benefits from harmonization.

Regulatory Flexibility Determination

The Regulatory Flexibility Act of 1980 (the Act) establishes "as a principle of regulatory issuance that agencies shall endeavor, consistent with the objective of the rule and of applicable statutes, to fit regulatory and informational requirements to the scale of the

business, organizations, and governmental jurisdictions subject to regulation." To achieve that principle, the Act requires agencies to solicit and consider flexible regulatory proposals, and to consider the rationale for their actions. The Act covers a wide range of small entities, including small businesses, not-for-profit organizations and small governmental jurisdictions. Agencies must perform a review to determine whether a proposed or final rule will have a significant economic impact on a substantial number of small entities. If the determination is that it will have such an impact, the agency must prepare a regulatory flexibility analysis as described in the Act. However, if an agency determines that a proposed, or final, rule is not expected to have a significant economic impact on a substantial number of small entities, section 605(b) of the 1980 act provides that the head of the agency may so certify and a regulatory flexibility analysis is not required. The certification must include a statement providing the factual basis for this determination, and the reasoning should be clear.

The FAA conducted the required preliminary analysis of this proposal and determined that it will not have a significant economic impact on a substantial number of small entities. The proposed rule would affect manufacturers of transport category airplanes (SIC 3721). For that industry, a small entity is defined as one with 1500 or fewer employees. There is not an airplane manufacturer, in part 25, whose number of employees falls below this employment threshold. Consequently, the FAA certifies that the proposed rule will not have a significant economic impact on a substantial number of small entities.

International Trade Impact Assessment

The proposed rule will standardize the requirements, concepts, and procedures, related to the future design and certification of airplanes with Class B and Class F cargo compartments

between the FAR, with standards proposed for the European JAR. Consequently, this proposal is expected to produce benefits, in terms of cost savings, from the harmonization of FAR and JAR standards. This should facilitate trade between the U.S. and other countries.

Unfunded Mandates Reform Act Analysis

Title II of the Unfunded Mandates Reform Act of 1995 (the Act), codified in 2 U.S.C. 1501-1571, requires each Federal agency, to the extent permitted by law, to prepare a written assessment of the effects of any Federal mandate, in a proposed or final agency rule, that may result in an expenditure by State, local, and tribal governments, in the aggregate, or by the private sector, of $100 million or more (adjusted annually for inflation) in any one year. Section 204(a) of the Act, 2 U.S.C. 1534(a), requires the Federal agency to develop an effective process to permit timely input by elected officers (or their designees) of State, local, and tribal governments on a proposed "significant intergovernmental mandate." A "significant intergovernmental mandate" under the Act is any provision in a Federal agency regulation that will impose an enforceable duty upon State, local, and tribal governments, in the aggregate, of $100 million (adjusted annually for inflation) in any one year. Section 203 of the Act, 2 U.S.C. 1533, which supplements section 204(a), provides that before establishing any regulatory requirements that might significantly or uniquely affect small governments, the agency shall have developed a plan that, among other things, provides for notice to potentially affected small governments, if any, and for a meaningful and timely opportunity to provide input in the development of regulatory proposals.

This proposed rule does not contain a Federal intergovernmental or private sector mandate that exceeds $100 million in any one year.

Regulations Affecting Interstate Aviation in Alaska

Section 1205 of the FAA Reauthorization Act of 1996 (110 Stat. 3213) requires the Administrator, when modifying regulations in title 14 of the CFR in manner affecting interstate aviation in Alaska, to consider the extent to which Alaska is not served by transportation modes other than aviation, and to establish such regulatory distinctions as he or she considers appropriate. Because this proposed rule would apply to the certification of future designs of transport category airplanes and their subsequent operation, it could, if adopted, affect interstate aviation in Alaska. The FAA therefore specifically requests comments on whether there is justification for applying the proposed rule differently in interstate operations in Alaska.

Executive Order 13132, Federalism

The FAA has analyzed this proposed rule under the principles and criteria of Executive Order 13132, Federalism. We determined that this action would not have a substantial direct effect on the States, on the relationship between the national Government and the States, or on the distribution of power and responsibilities among the various levels of government. Therefore, we determined that this notice of proposed rulemaking would not have federalism implications.

Environmental Analysis

FAA Order 1050.1D defines FAA actions that may be categorically excluded from preparation of a National Environmental Policy Act (NEPA) environmental impact statement. In accordance with FAA Order 1050.1D, appendix 4, paragraph 4(j), this proposed rulemaking action qualifies for a categorical exclusion.

Energy Impact

The energy impact of the notice has been assessed in accordance with the Energy Policy and Conservation Act (EPCA) Pub. L. 94-163, as amended (42 U.S.C. 6362) and FAA Order 1053.1. It has been determined that the notice is not a major regulatory action under the provisions of the EPCA.

List of Subjects

14 CFR Part 25

Aircraft, Aviation safety, Federal Aviation Administration, Reporting and recordkeeping requirements.

The Proposed Amendment

In consideration of the foregoing, the Federal Aviation Administration proposes to amend part 25 of Title 14, Code of Federal Regulations, as follows:

PART 25 – AIRWORTHINESS STANDARDS – TRANSPORT CATEGORY

1. The authority citation for part 25 continues to read as follows:

Authority: 49 U.S.C. 106(g), 40113, 44701, 44702, 44794.

2. Section 25.855 is amended by revising subparagraph (b) and (c) as follows:

§ 25.855 Cargo or baggage compartments.

* * * * *

(b) Class B through Class F cargo or baggage compartments, as defined in § 25.857, must have a liner, and the liner must be separate from (but may be attached to) the airplane structure.

(c) Ceiling and sidewall liner panels of Class C, and, unless other means of containing the fire and protecting critical systems and structure are provided, Class F

cargo or baggage compartments must meet the test requirements of Part III of Appendix F of this part or other approved equivalent methods.

* * * * *

3. Section 25.857 is amended by revising paragraph (b)(1) and adding a new paragraph (f) as follows:

§ 25.857 Cargo compartment classification.

* * * * *

(b) Class B. A Class B cargo or baggage compartment is one in which :

(1) There is sufficient access in flight to enable a crewmember, standing at any one access point and without stepping into the compartment, to extinguish a fire occurring in any part of the compartment using a hand fire extinguisher.

* * * * *

(f) Class F. A Class F cargo or baggage compartment is one in which--

(1) There are means to extinguish or control a fire without requiring a crewmember to enter the compartment;

(2) There are means to exclude hazardous quantities of smoke, flames, or extinguishing agent, from any compartment occupied by the crew or passengers;

(3) There is a separate approved smoke detector or fire detector system to give warning at the pilot or flight engineer station.

Issued in Washington, D. C., on

12-13-00: Incorporates reg. eval. and new boilerplate

01-23-01: Revised per NS changes

04-02-01: Revised by M. Wahi per comments by Perry Eskridge (ANM-7)

04-17-02: Revised per ANM-7 comments (Perry)

Draft Advisory Circular

U.S. Department
of Transportation
Federal Aviation
Administration

Subject: **CLASS B and F CARGO COMPARTMENTS** Date: AC No. **25.857-1X**

Initiated by: **ANM-112**

1. PURPOSE. This advisory circular (AC) sets forth an acceptable means, but not the only means, of demonstrating compliance with the provisions of the airworthiness standards for transport category airplanes related to the Class B and Class F cargo compartments for transport category airplanes. Like all AC material, this AC is not, in itself, mandatory and does not constitute a regulation. Terms used in this AC, such as "shall" and "must," are used only in the sense of ensuring applicability of this particular method of compliance when the acceptable method of compliance described herein is used. This AC provides guidance with respect to Amendment 25-YY, which became effective [insert date].

2. RELATED FAR SECTIONS. Part 25, §§ 25.851 "Fire extinguishers," 25.855 "Cargo or baggage compartments," 25.857 "Cargo compartment classification," and 25.858 "Cargo compartment fire detection systems."

3. BACKGROUND. Sections 25.857(b) and 25.857(f) provide standards for certification of two classes of cargo compartments; Class B and Class F. A Class B compartment is configured in a manner which allows a crewmember to extinguish or control any fire likely to occur in the compartment using a hand fire extinguisher. While access to the compartment is present, it is not necessary for the person combating the fire to physically enter the compartment. The contents of the compartment may be reached by hand or with the contents of a hand extinguisher, while standing in the entry door. A Class F compartment is similar to a Class C compartment in that there are means to extinguish or control the fire without any requirement for access. Both Class B and Class F compartments have fire or smoke detection systems to alert the crew to the presence of the fire. This AC provides a rational method for demonstrating that the requirements of the related sections of the Federal Aviation Regulations (FAR) are met, and that fires occurring in the compartments can be controlled to ensure that they do not present a hazard to the airplane or its occupants.

4. COMPARTMENT CLASSIFICATION. All cargo compartments must be properly classified in accordance with § 25.857 and meet the requirements of § 25.857 pertaining to the particular class involved. In order to establish appropriate requirements for fire protection, a system for

classification of cargo or baggage compartments was developed and adopted for transport category airplanes on November 1, 1946, as Amendment 04-1 to Part 04 of the Civil Air Regulations (CAR). Classes A, B, and C were initially established; Classes D, E, and F were added later. The classification is based on means by which a fire can be detected, for those classes of compartments, which require detection, and the means available to control the fire.

a. A Class A compartment is one that is located so close to the station of a crewmember that the crewmember would discover the presence of a fire immediately. In addition, each part of the compartment is easily accessible so that the crewmember could quickly extinguish a fire with a portable fire extinguisher. A Class A compartment is not required to have a liner.

(1) Typically, a Class A compartment is a small open compartment in the cockpit area used for storage of crew luggage. A Class A compartment is not, however, limited to such use; it may be located in the passenger cabin and used for other purposes provided it is close to a normally staffed crewmember's station. Typically, the crewmember would be a member of the flightcrew; however, the compartment could be located adjacent to the station of any other crewmember.

(2) Because a Class A compartment does not have a liner, it is absolutely essential that the compartment be small and located close enough to a crewmember that any fire that might occur could be discovered and extinguished immediately. Without a liner to contain it, an undetected or uncontrolled fire could quickly become catastrophic by burning out of the compartment and spreading throughout the airplane. All portions of the compartment must be virtually within arms length of the crewmember in order for any fire to be detected immediately and extinguished in a timely manner. Although there may be some exceptions, such as a 'U-Shaped' compartment for example, a Class A compartment greater than 50 cubic feet in volume would not typically have the accessibility required by § 25.857(a)(2) for fighting a fire.

b. A Class B compartment is one that is more remote than a Class A compartment and must, therefore, incorporate a fire or smoke detection system to give warning at the pilot or flight engineer station. Because a fire could not be detected and extinguished as quickly, a Class B compartment must have a liner in accordance with § 25.855. A Class B cargo or baggage compartment has sufficient access in flight to enable a crewmember to reach any part of the compartment by hand or with the contents of a hand extinguisher when standing at any one access point, without stepping into the compartment. There are means to ensure that, while the access provisions are being used, no hazardous quantity of smoke, flames, or extinguishing agent will enter areas occupied by the crew or passengers.

c. A Class C compartment differs from a Class B compartment in that it is not required to be accessible in flight and must, therefore, have a built-in fire extinguishing system to suppress or control any fire occurring therein. A Class C compartment must have a liner and a fire or smoke detection system in accordance with §§ 25.855 and 25.857. There must also be means to exclude hazardous quantities of extinguishant and products of combustion from occupied areas.

d. A Class E compartment is found on an all-cargo airplane. Typically, a Class E compartment is the entire cabin of an all-cargo airplane; however, other compartments of such airplanes may be classified as Class E compartments. A fire in a Class E compartment is controlled by shutting off the ventilating airflow to or within the compartment. A Class E compartment must have a liner and a fire or smoke detection system installed in accordance with § 25.857(e); however, it is not required to have a built-in fire suppression system.

e. A Class F compartment is one in which there are means to control or extinguish a fire without requiring a crewmember to enter the compartment. Allowing access by a crewmember in the presence of a fire warning is not envisioned. The Class F compartment must have a fire or smoke detection system installed in accordance with § 25.857(f). Unless there are other means of containing the fire and protecting critical systems and structure, a Class F compartment must have a liner meeting the requirements of part III of Appendix F, or other approved equivalent methods.

5. FIRE PROTECTION FEATURES. The fire protection features required for the class of compartment involved, e.g., liners, fire or smoke detection systems, hand-held fire extinguishers, and built-in fire suppression systems, must be provided, and they must be shown to meet the standards established by the original type certification basis for the airplane or later part 25 standards.

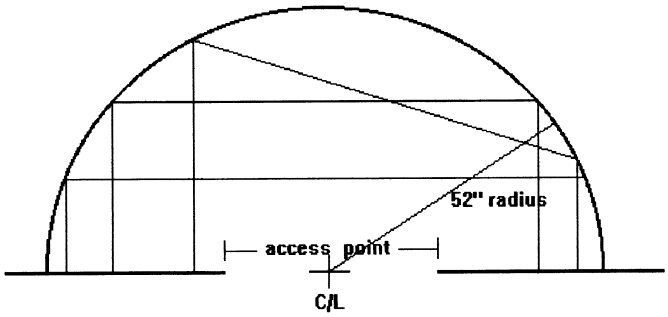
a. The primary purpose of a liner is to prevent a fire originating in a cargo compartment from spreading to other parts of the airplane before it can be brought under control. For Class B compartments, it is assumed that the fire will be quickly extinguished. Therefore, the liner need not be qualified to Part III of Appendix F requirements. For Class F cargo compartments, the fire might have grown larger prior to being suppressed, and therefore, better protection is needed to prevent damage to surrounding systems and structure. Insofar as that purpose is concerned, the liner does not need to serve as the compartment seal. It should be noted, however, that the liner is frequently used to perform the secondary functions of containing discharged extinguishing agent and controlling the flow of oxygen into the compartment. If other means, such as compartment walls, are not capable of performing those functions, the liner must be sufficiently airtight to perform them.

b. The liner must have sufficient fire integrity to prevent flames from burning through the liner before the fire can be brought under control and the heat from the fire is sufficiently dissipated. As noted in Part III of Appendix F, in addition to the basic liner material, the term "liner" includes any design feature, such as a joint or fastener, that would affect the capability of the liner to safely contain a fire.

c. In the case of a Class B compartment as defined in Amendment 25-YY, there must be sufficient accessibility to enable a crewmember to reach the contents of the compartment by hand or with the contents of a hand extinguisher without physically entering the compartment. This requirement, by its nature, tends to limit the size and shape of the compartment. Additionally, the access provisions should be sufficiently large to enable the crewmember to visually determine that a fire has been extinguished.

(1) "To reach any part of the compartment" means that the crewmember should be able to open the door or hatch and, standing in the opening, reach by hand anywhere in the compartment where cargo or baggage can be located. The extension of the crewmember's reach through the use of fire extinguisher wands, etc., should not be considered in determining reach.

(2) Based on the estimated reach of a 95 percentile male, the outline of any compartment, viewed from above, should fit within a vertical cylinder of radius 52 inches measured from the centerline of the access door or hatch (see Figure 1). This dimension assumes the above male can reach a one foot square box located anywhere within the compartment. It is understood that access by a smaller crewmember to reach the same area within the compartment could require that the crewmember move laterally within the access door or hatch opening, while not physically entering the compartment.



Examples of possible cargo compartment shapes within 52" reach from access point centerline.

FIGURE 1.

d. In the case of a Class F compartment, a means must be provided to control or extinguish a fire without a crewmember entering the compartment.

(1) One means might be to design the compartment to Class C requirements but without having a built in fire suppression system. One suppression method might be to utilize a plumbing and nozzle distribution system within the compartment that would provide acceptable suppression capability throughout the volume of the compartment. The source for such a system could be hand-held fire extinguishers, which interface with the distribution system through a suitable interface nozzle. This reduces the complexity and costs associated with a built-in suppression system and could be suitable for smaller compartments. For certification purposes, the extinguishing agent concentration should be measured in flight, following airplane flight manual (AFM) procedures, and the length of protection time afforded by the system recorded. This time of protection should be used to establish flight manual limitations for cargo or baggage compartment fire protection times. These times could then be used by the operator for route planning. For Halon 1301 fire extinguishing agent, a five percent concentration by volume is

considered adequate for initial knock-down of a fire, and a three percent concentration by volume is considered the minimum for controlling a fire after it is knocked down. The use of this option requires the use of a liner, if needed, as noted in § 25.855(c).

(2) Another means to provide fire protection in a Class F compartment might be the use of cargo containers or covers shown to be capable of containing a fire. Because the fire is controlled or extinguished within the compartment but is isolated from the actual compartment boundaries, the liner requirements of § 25.855(c) would not apply. However, the effects of the heat generated by the covered fire should be evaluated to ensure that adjacent systems and structure are not adversely affected.

(3) It is recognized that other means of controlling or extinguishing fires in Class F compartments may be developed in the future. It is not the intent of this AC to limit the choices available for meeting the requirements to those discussed above.

(4) Additional protective breathing equipment or breathing gas supply, and additional fire extinguishers, may be required to ensure that the fire can be controlled for the time the airplane is expected to be in the air after onset of a fire.

e. Whether a compartment is classified as Class B or Class F, it must be demonstrated that hazardous quantities of smoke, flames, extinguishing agent, or noxious gasses do not enter any compartment occupied by passengers or crewmembers. Advisory Circular 25-9A, Smoke Detection, Penetration, and Evacuation Tests and Related Flight Manual Emergency Procedures, provides guidance concerning smoke penetration testing.

f. If an airplane has one or more Class B cargo compartments, portable protective breathing equipment must be provided for the appropriate crewmembers in accordance with § 25.1439. If the airplane is operated under part 121, the protective breathing equipment must meet the more stringent standards of § 121.337.

g. "To control a fire" (§ 25.857(f)(1)) implies that the fire does not grow to a state where damage to the airplane or harm to the passengers or crew occurs during the time for which the fire protection system is demonstrated to be effective. This in turn implies that critical airplane systems and structure are not adversely affected and the temperature and air contaminants in areas occupied by passengers and crew do not reach hazardous levels. Adequate protection should be provided for cockpit voice and flight data recorder and wiring, windows, primary flight controls (unless it can be shown that a fire cannot cause jamming or loss of control), and other systems and equipment within the compartment that are required for safe flight and landing. If protective covers are used, they must be constructed of materials that meet the Flame Penetration Resistance requirements of part 25, Appendix F, Part III (Amendment 25-60).

6. PROCEDURES AND LIMITATIONS.

a. The cargo or baggage loading limitations and any operational limitations or procedures provided to ensure that the contents of a Class B compartment are accessible to combat a fire

must be identified with placards in the compartment and addressed in the appropriate weight and balance or loading document.

b. Any operational limitations or procedures necessary to ensure the effectiveness of the fire protection system for Class B and Class F cargo and baggage compartments should be clearly defined in the AFM. This should include such items as any changes to the ventilation system to prevent the entrance of smoke or gasses into occupied areas, use of hand-held fire extinguishers, use of protective breathing equipment, use of protective clothing, etc. The certification engineers should work closely with the FAA Flight Standards organization (Aircraft Evaluation Group) to ensure that additional training necessary for crewmembers assigned to combat fires is adequately addressed.

c. Any limitations regarding the time limit for a cargo or baggage compartment fire protection system, or other conditions or procedures related to combating a fire in a compartment, should be clearly defined in the AFM.

7. AIRPLANE FLIGHT MANUAL CONSIDERATIONS

a. For Class B compartments, it is important to note that special training is needed for the crewmember(s) designated to combat a fire in the compartment. The certification office should work with the appropriate organization to ensure that training in the use protective breathing equipment, fire extinguishers, protective gloves and clothing, is provided. Fires occurring in luggage are difficult to extinguish completely. Rekindling is not unlikely. Crewmembers designated to combat fires in Class B compartments should be trained to check periodically to ensure that any fire that has occurred has not grown back to hazardous proportions.

b. Airplane flight manuals should contain instructions to land at the nearest suitable airport following smoke/fire detection unless it can be positively determined that the fire is extinguished.

c. Any limitations regarding occupancy of Class B and Class F compartments during flight, or during takeoff and landing, should be defined in the AFM.

d. Any loading restrictions associated with access to cargo or baggage or special containers should be clearly identified in the AFM. This would include, but not be limited to, placement of luggage in a Class B compartment or identification of special containers or covers associated with fire protection in a Class F compartment.

12-13-00: Incorporate Mahinder's changes
1-23-01: Revised per NS changes
4-02-01 Revised by M. Wahi per Perry Eskridge/ANM-7

FAA Action

Mr. Craig R. Bolt
Manager, Product Development and Validation
Pratt & Whitney
Mail Stop 162-12
East Hartford, CT 06108

Dear Mr. Bolt:

In an effort to clean up pending Aviation Rulemaking Advisory Committee (ARAC) recommendations on Transport Airplane and Engine Issues, the recommendations from the following working groups have been forwarded to the proper Federal Aviation Administration offices for review and decision. We consider your submittal of these recommendations as completion of the ARAC tasks. Therefore, we have closed the tasks and placed the recommendations on the ARAC website at http://www.faa.gov/avr/arm/arac/index.cfm

Date	**Task**	**Working Group**
December 1999	Interaction of Systems and Structure Part 33 Static Parts	Loads and Dynamics Harmonization Working Group
March 2000	Part 35/JARP: Airworthiness Standards Propellers	Engine Harmonization Working Group
April 2000	Flight Characteristics in Icing conditions	Flight Test Harmonization Working Group
May 2000	Thrust Reversing Systems	Powerplant Installation Harmonization Working Group
September 2000	Lightning Protection Requirements	Electromagnetic Effects Harmonization Working Group
July 2001	Main Deck Class B Cargo Compartments	Cargo Standards Harmonization Working Group
April 2002	Design Standard for Flight Guidance	Flight/Guidance Systems Harmonization Working Group

I wish to thank the ARAC and the working groups for the resources they spent in developing these recommendations. We will continue to keep you apprised of our efforts on the ARAC recommendations at the regular ARAC meetings.

Sincerely,

Anthony F. Fazio
Executive Director, Aviation Rulemaking
Advisory Committee